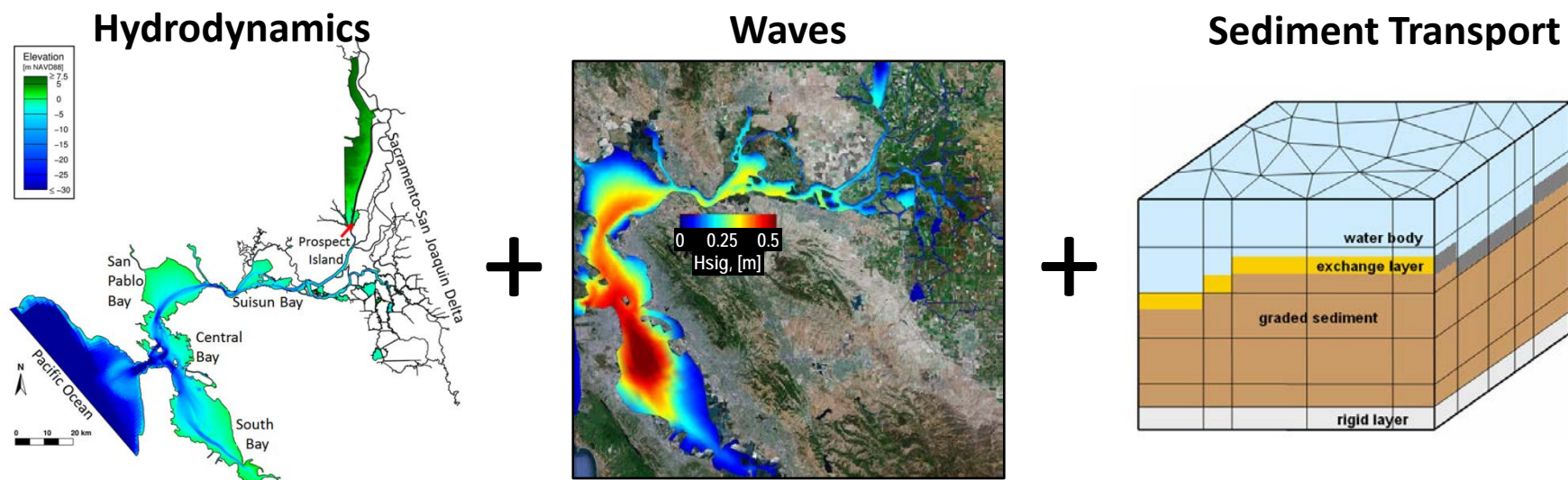


# Evaluation of the Effects of Prospect Island Restoration on Sediment Transport and Turbidity

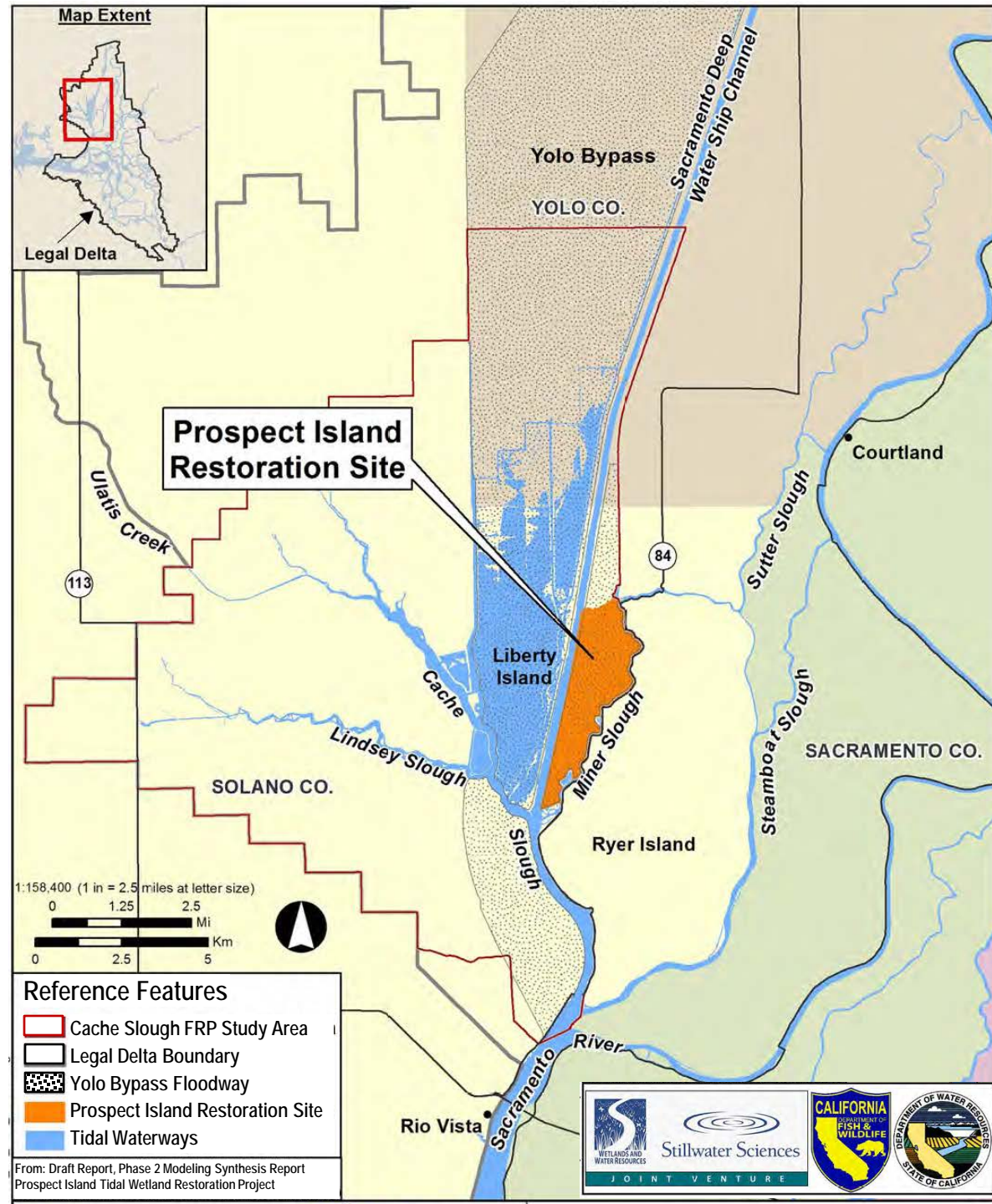


Michael MacWilliams, Aaron Bever, Noah Hume,  
Erik Loboschfsky, Stuart Siegel

*February 26, 2014*

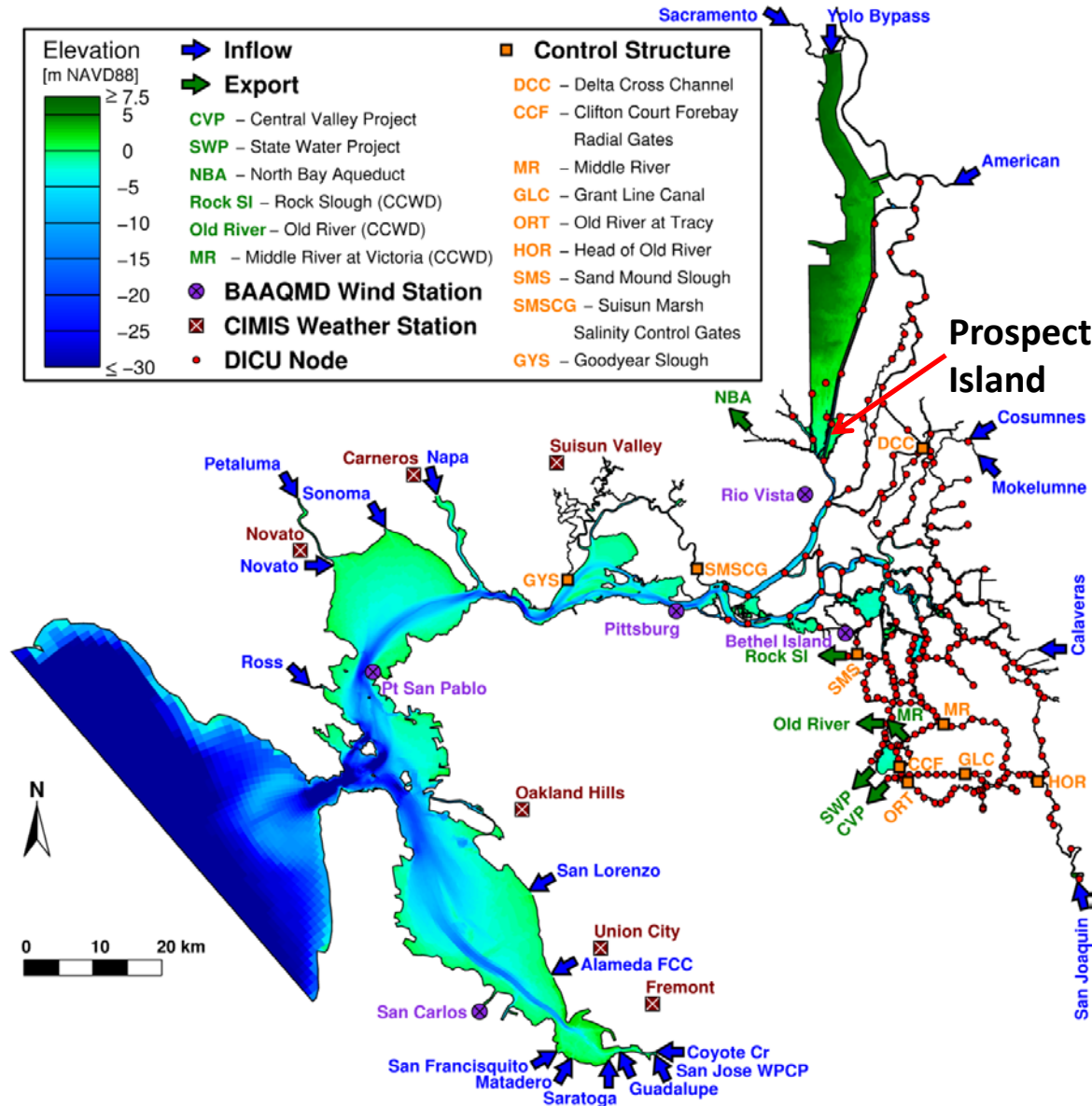
# Prospect Island Tidal Habitat Restoration Project

- Joint effort by California DWR and California Department of Fish & Wildlife.
- Restore up to 1,600 acres to freshwater tidal wetland.



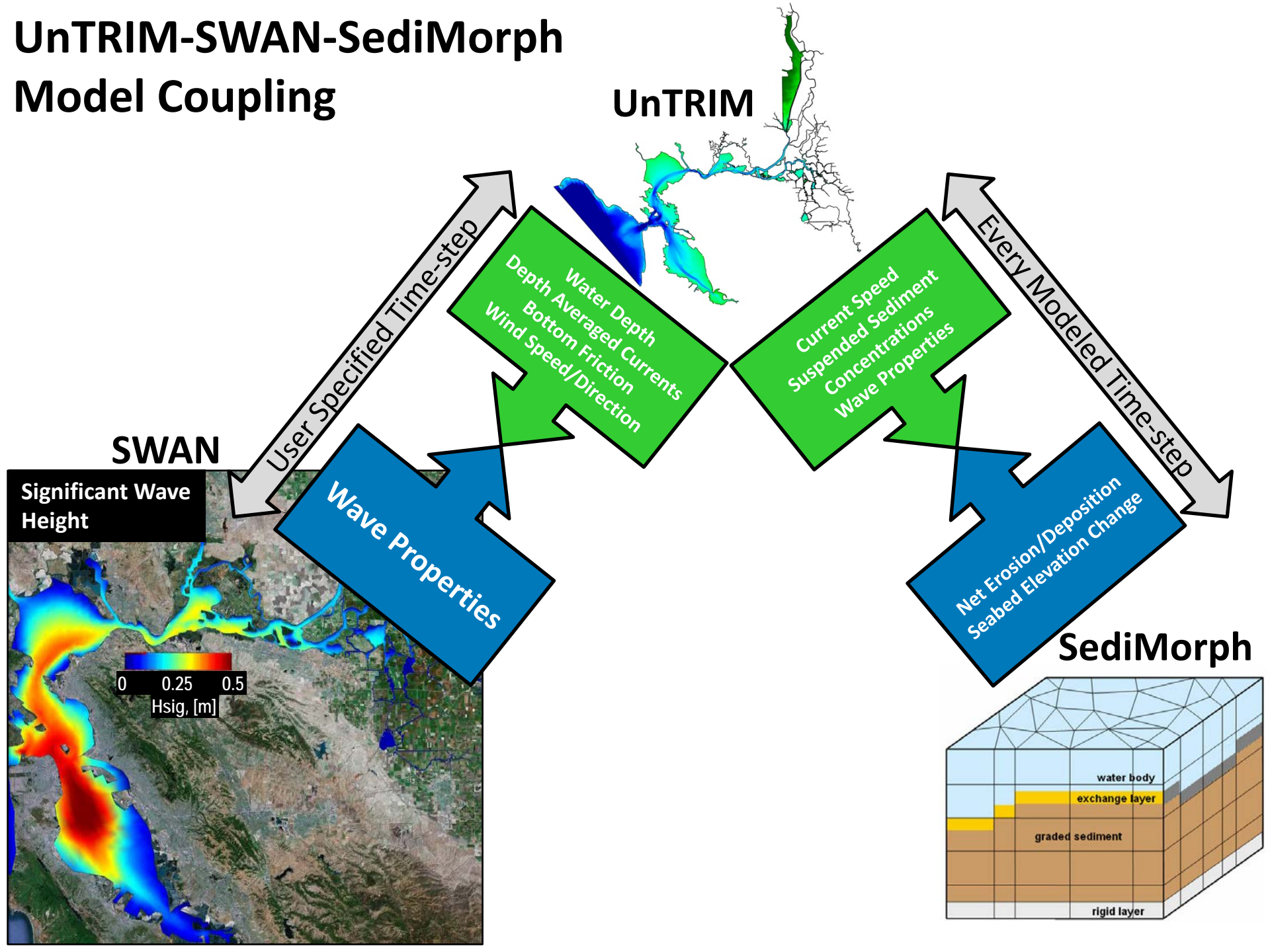
# UnTRIM San Francisco Bay-Delta Model

- Applied to evaluate sediment transport near the Prospect Island Habitat Restoration Project for a suite of restoration scenarios.
- Compare how two different breach configurations affect regional turbidity and sediment deposition within Prospect Island.

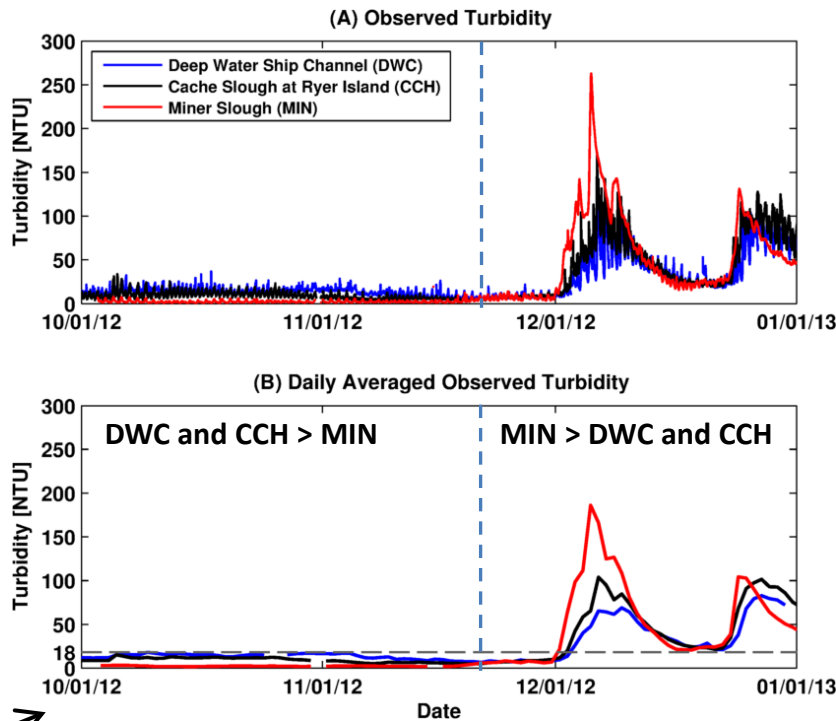
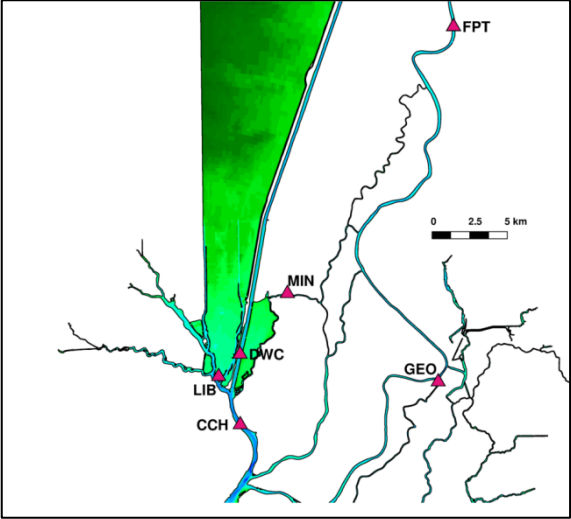
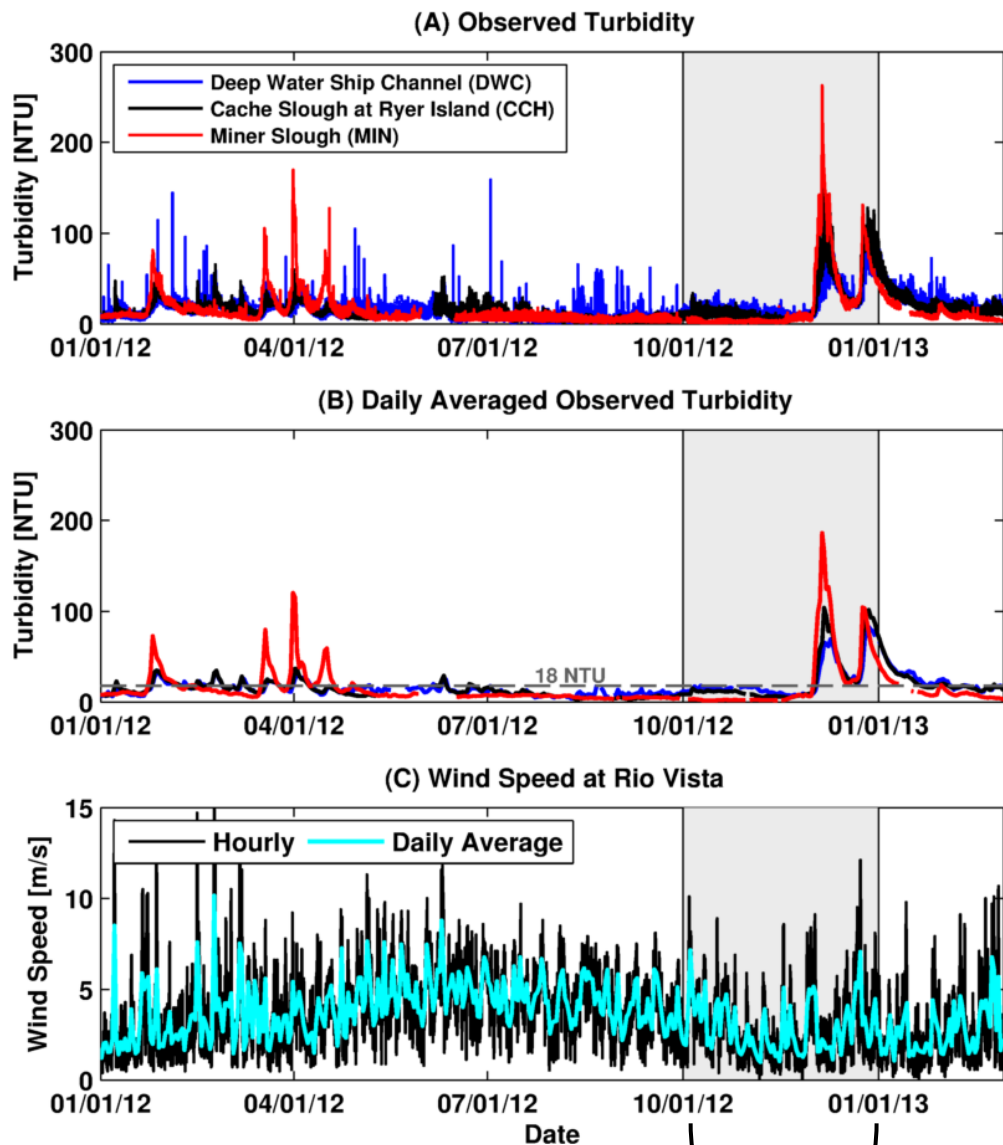




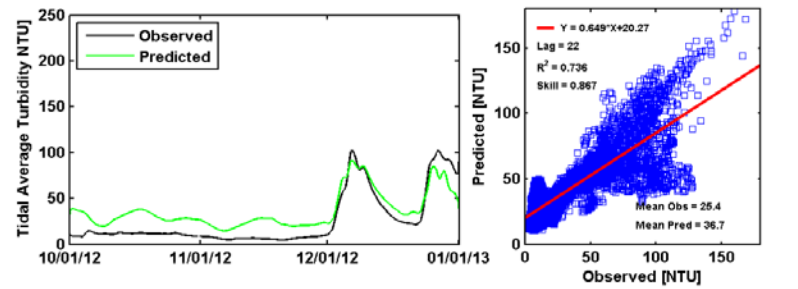
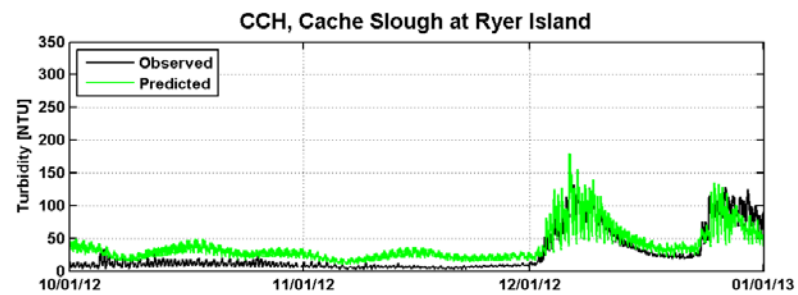
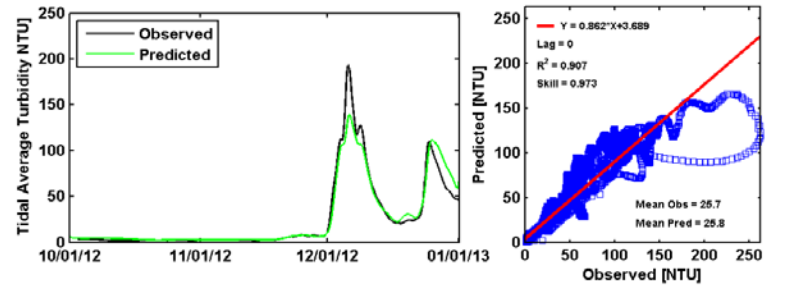
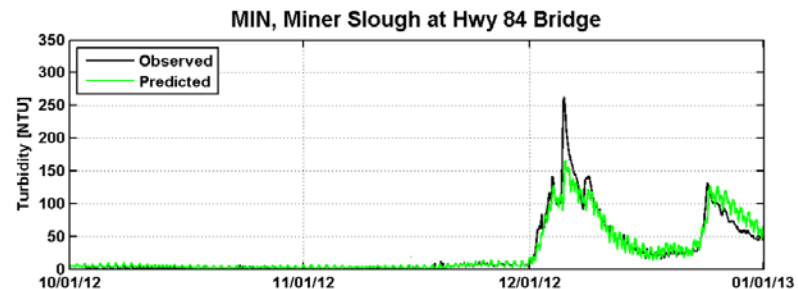
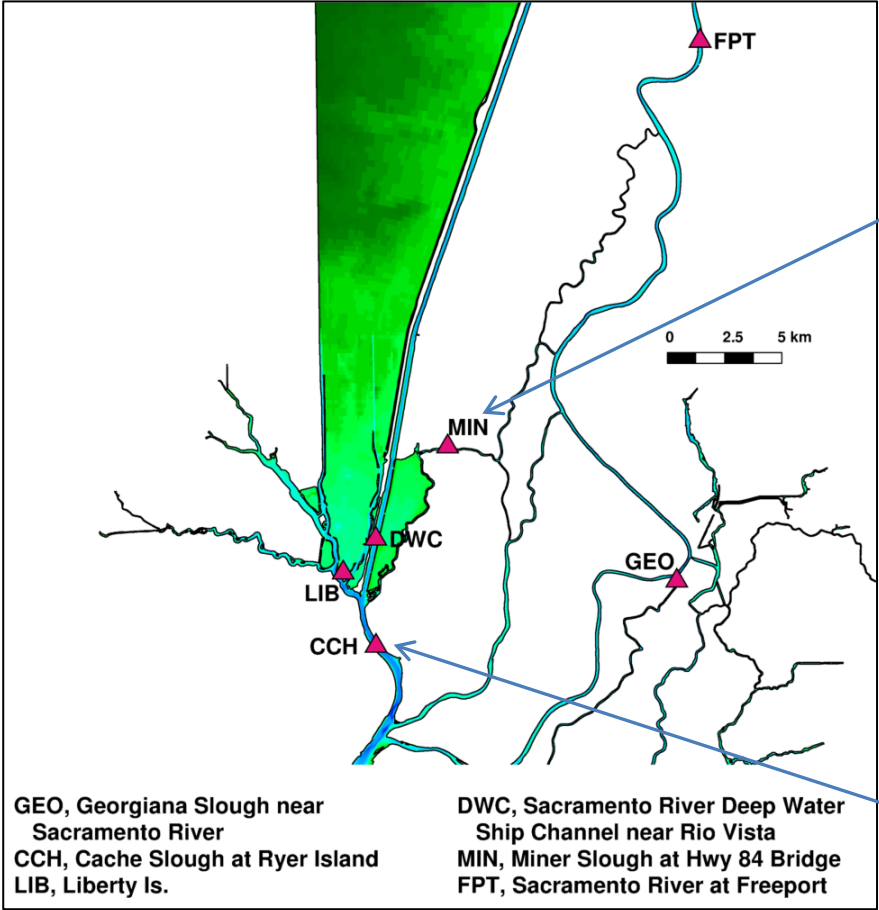
# UnTRIM-SWAN-SediMorph Model Coupling



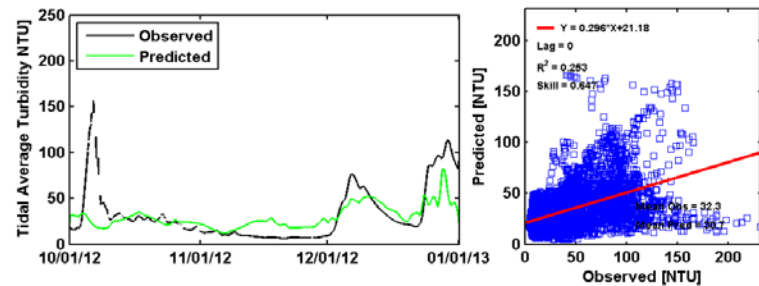
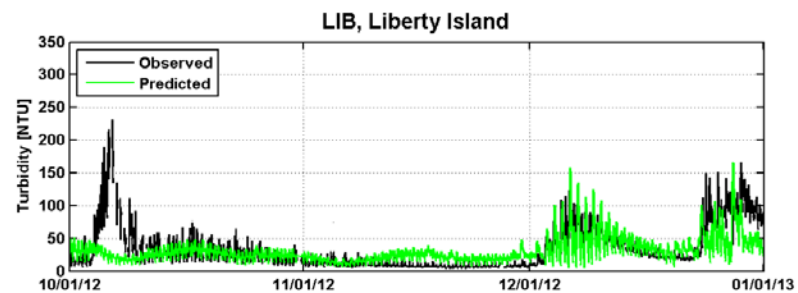
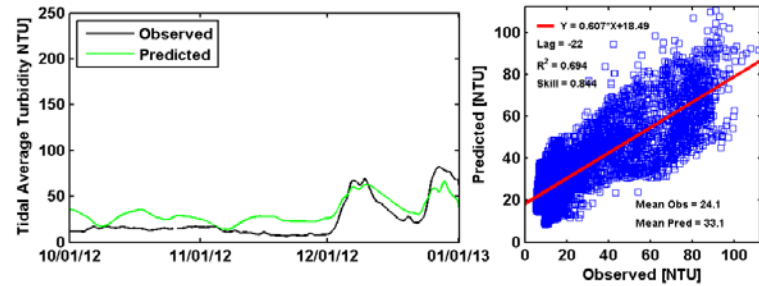
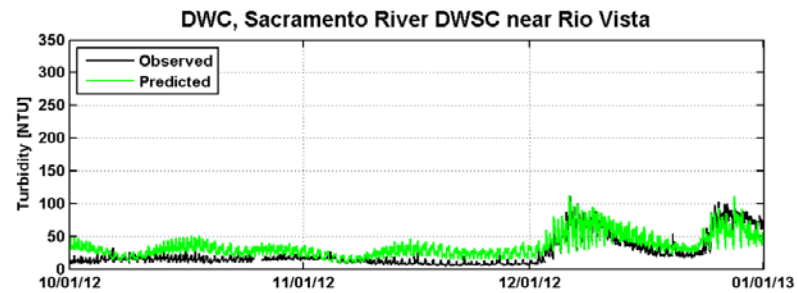
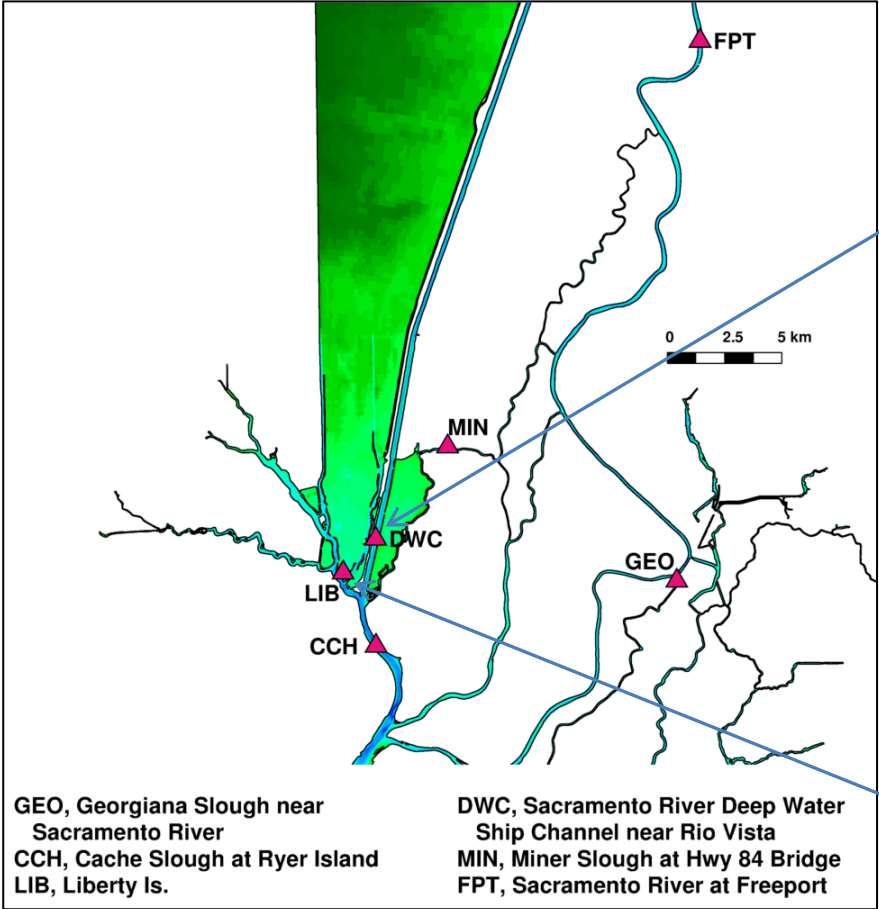
# Observed Turbidity Around Prospect Island



# Suspended Sediment Validation Around Prospect Island



# Suspended Sediment Validation Around Prospect Island





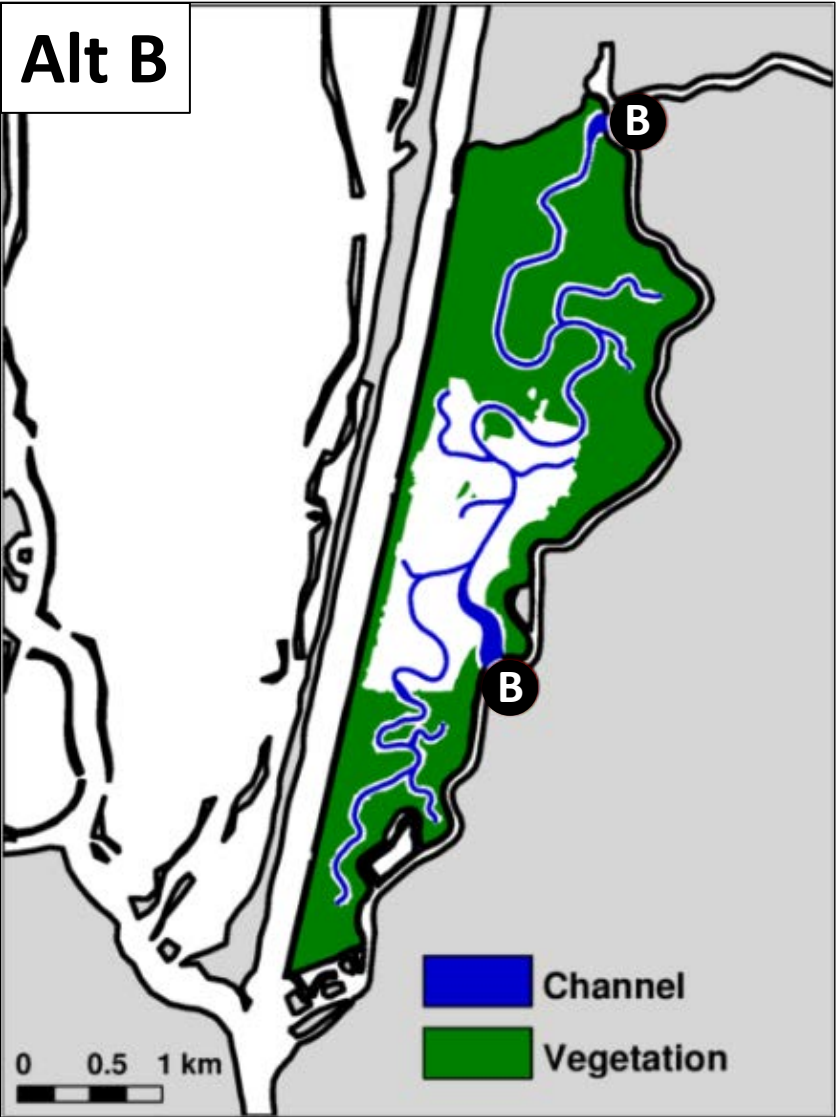
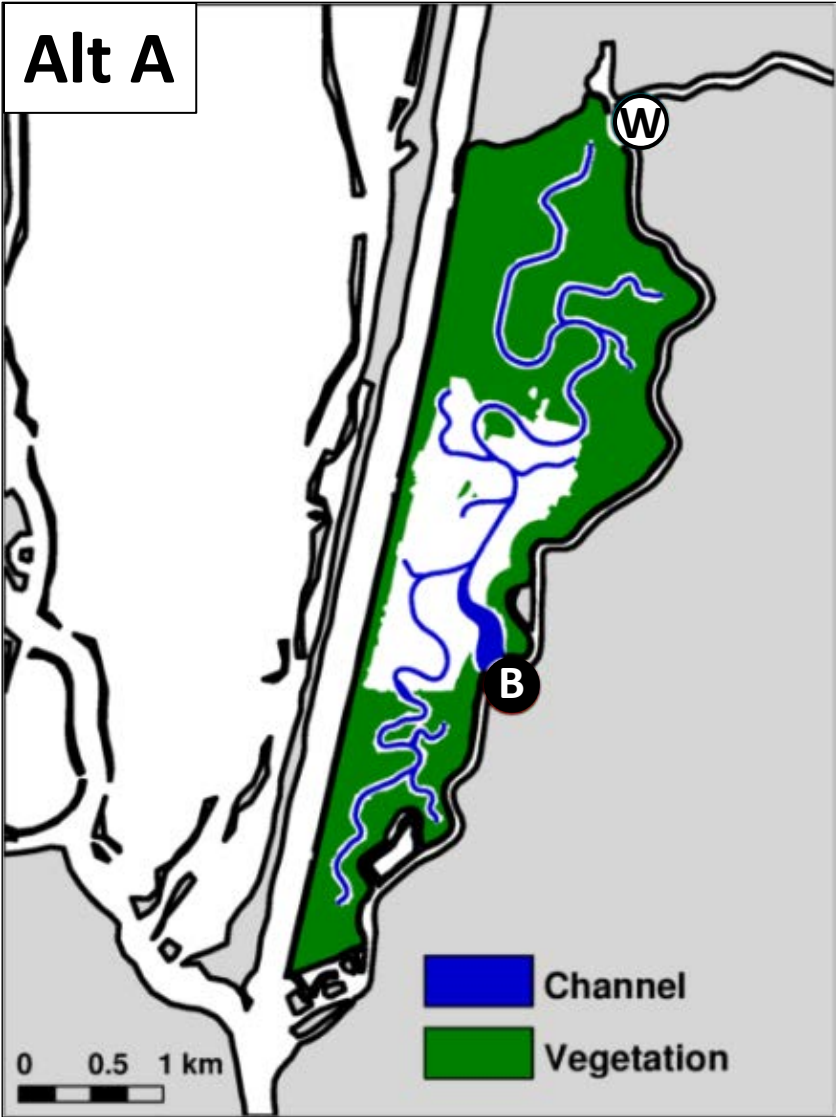
# Comparison of Two Restoration Alternatives

●

Breach

○

Weir



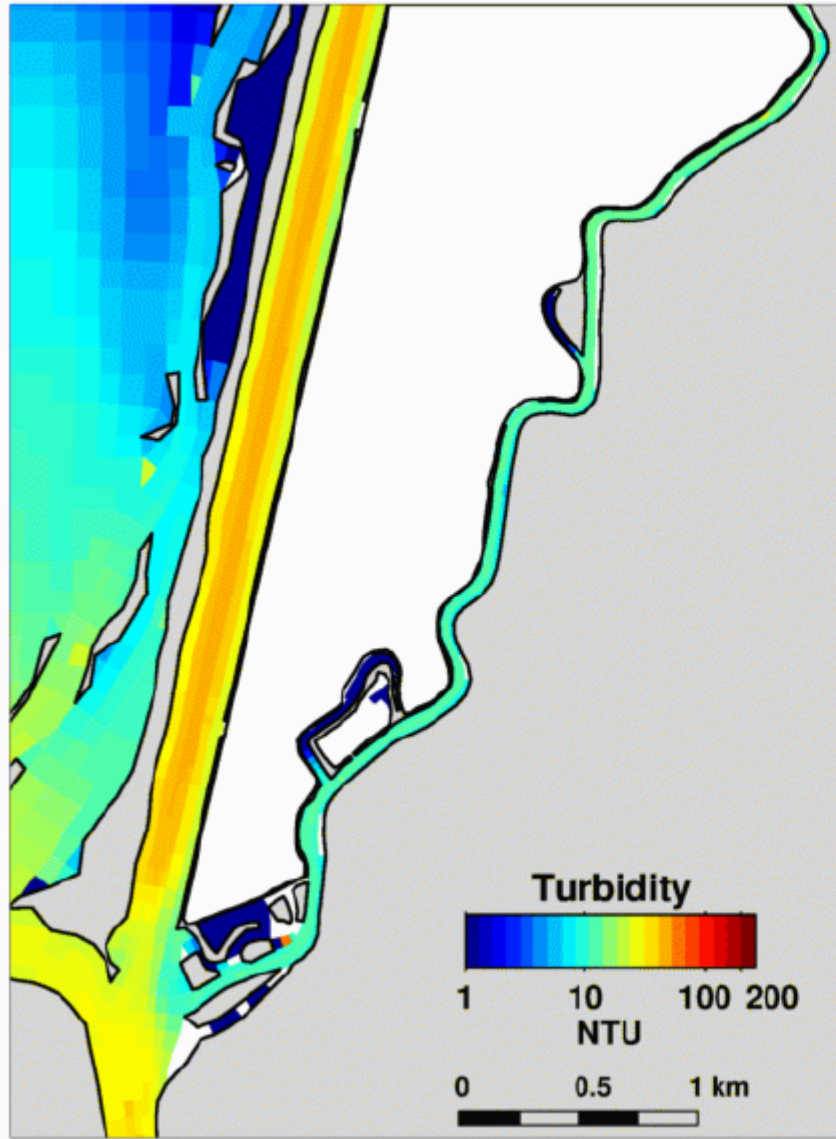


# Predicted Turbidity: Low Delta Outflow

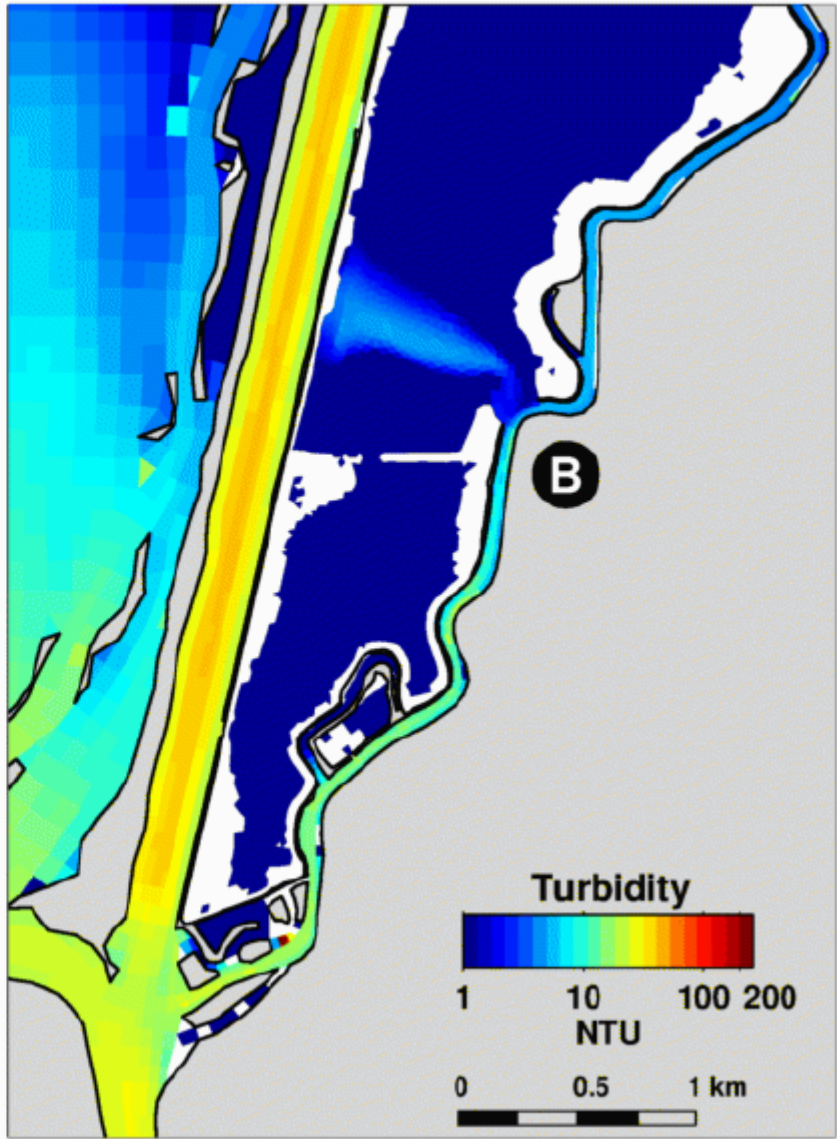
Note: This slide was an animation which is not embedded in the pdf.

01-Oct-2012 01:00 PST

Baseline



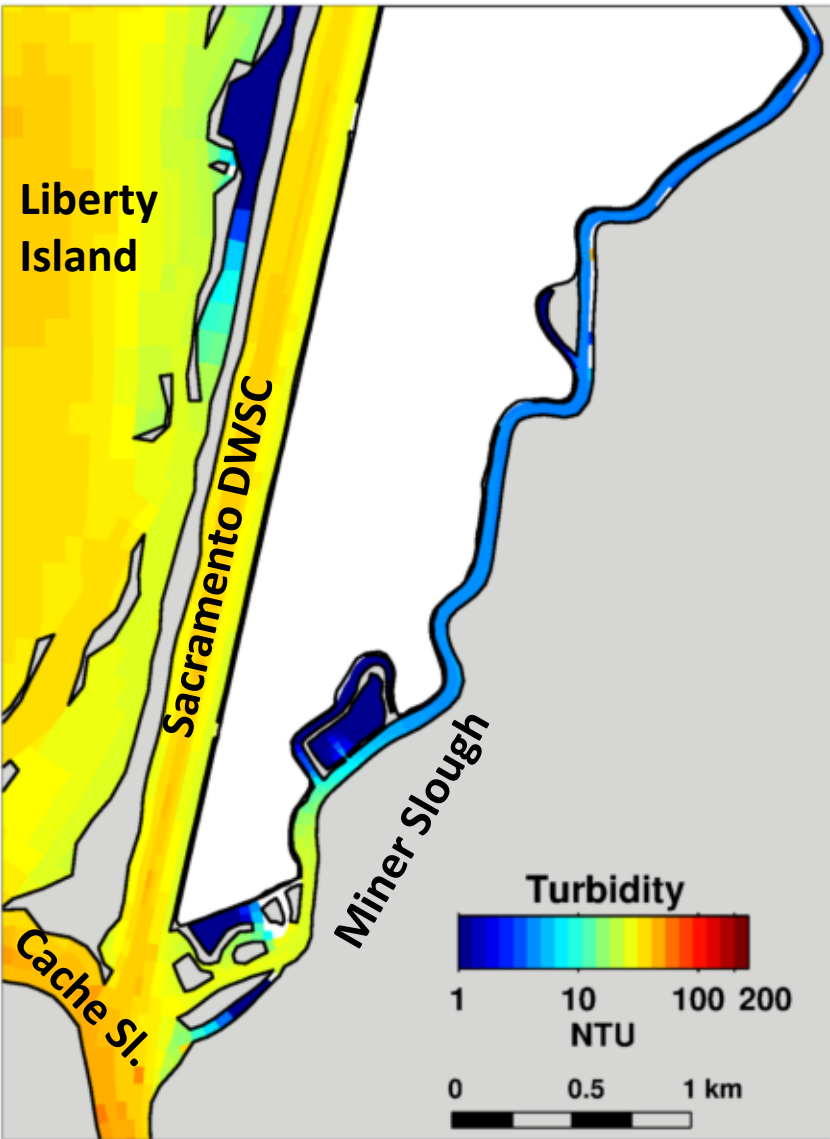
Alt A



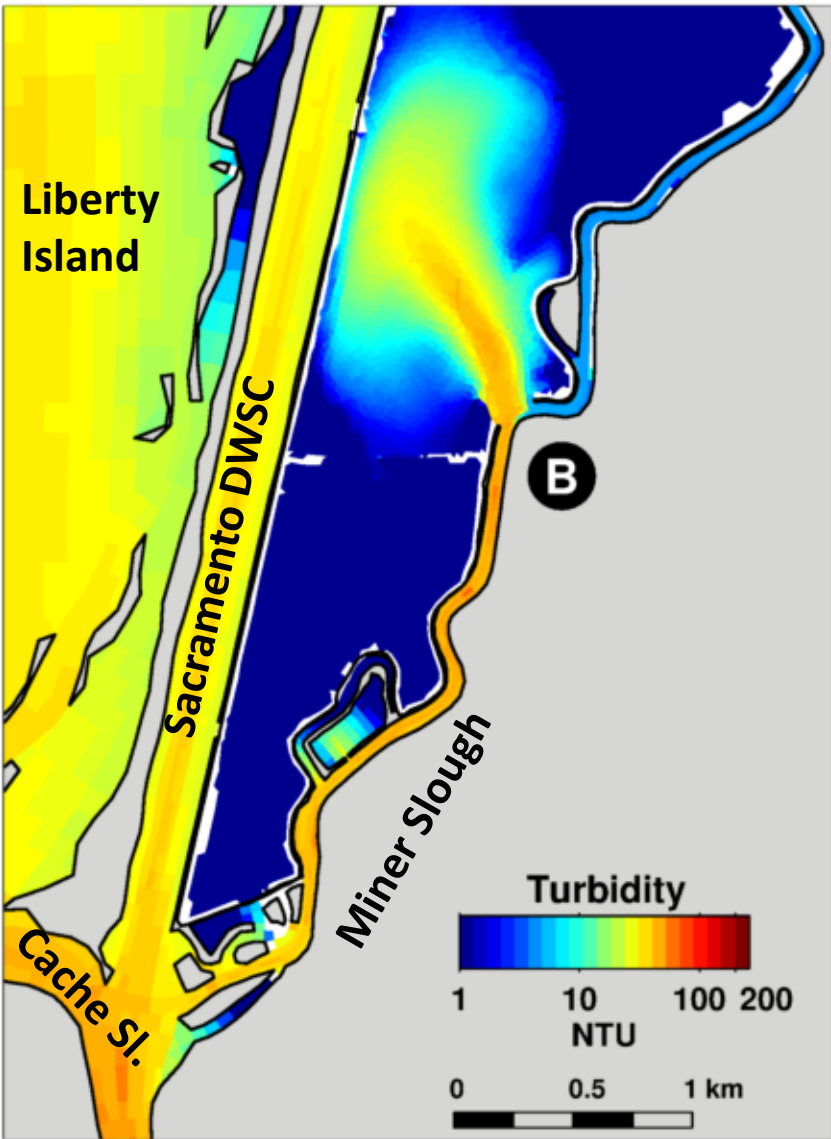
# Predicted Turbidity: Low Delta Outflow

04-Oct-2012 18:00 PST

Baseline



Alt A

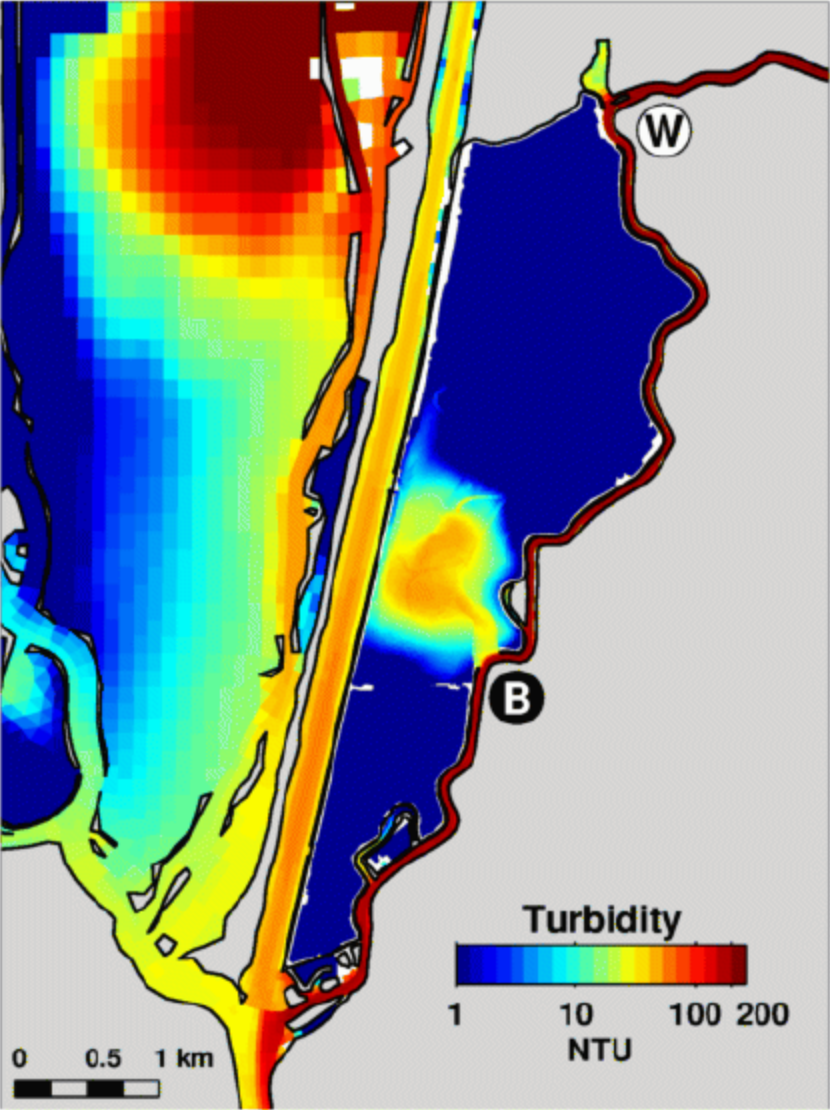


# Predicted Turbidity: High Delta Outflow

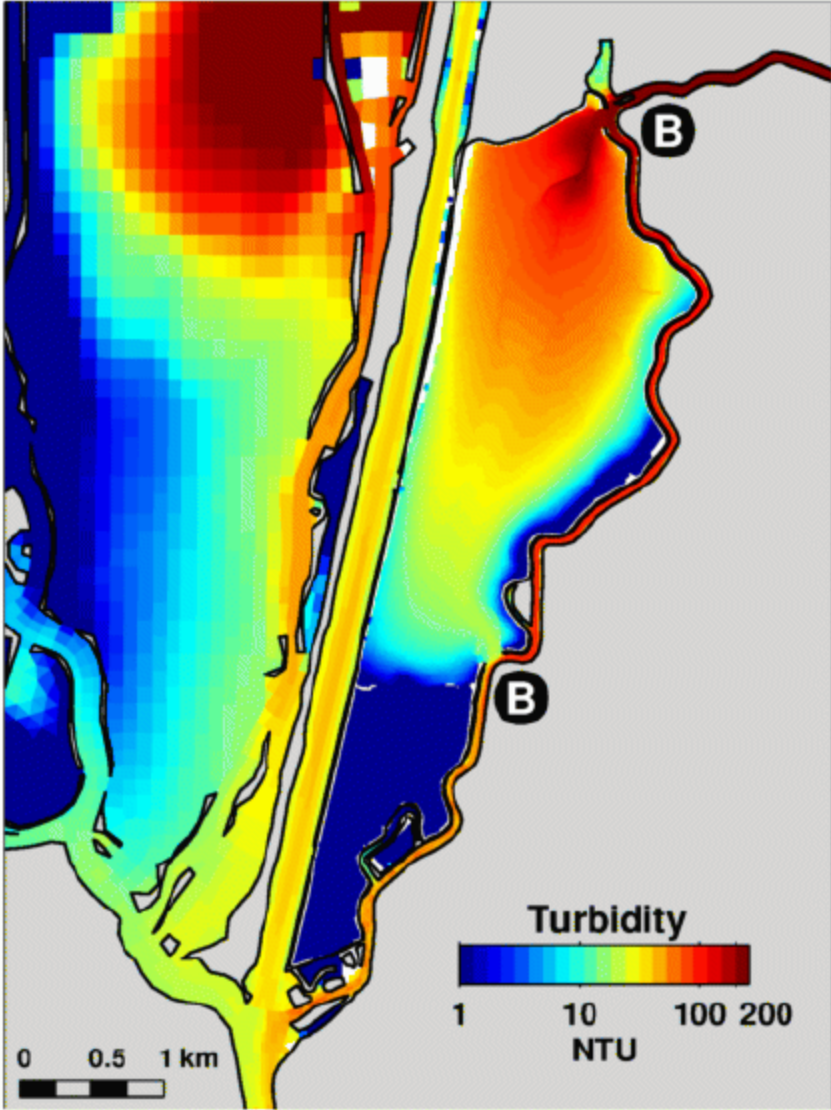
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27-Dec-2012 10:00 PST

Alt A



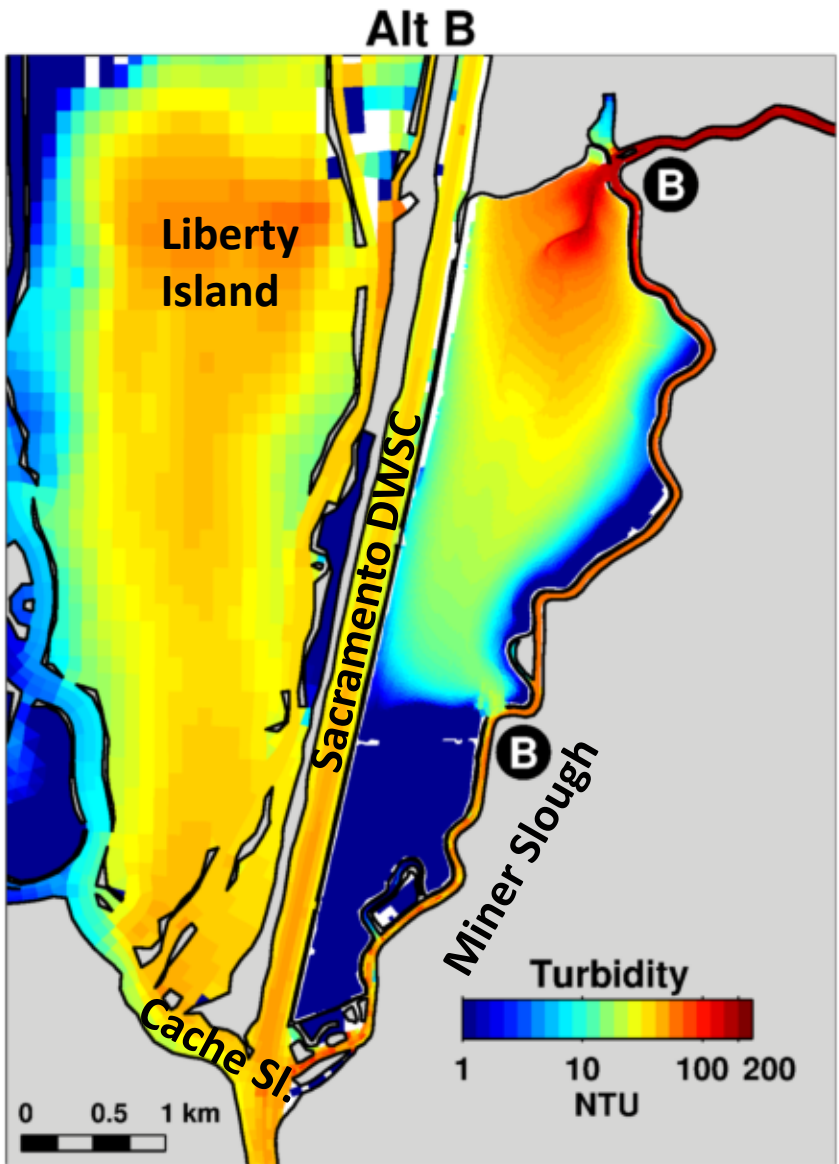
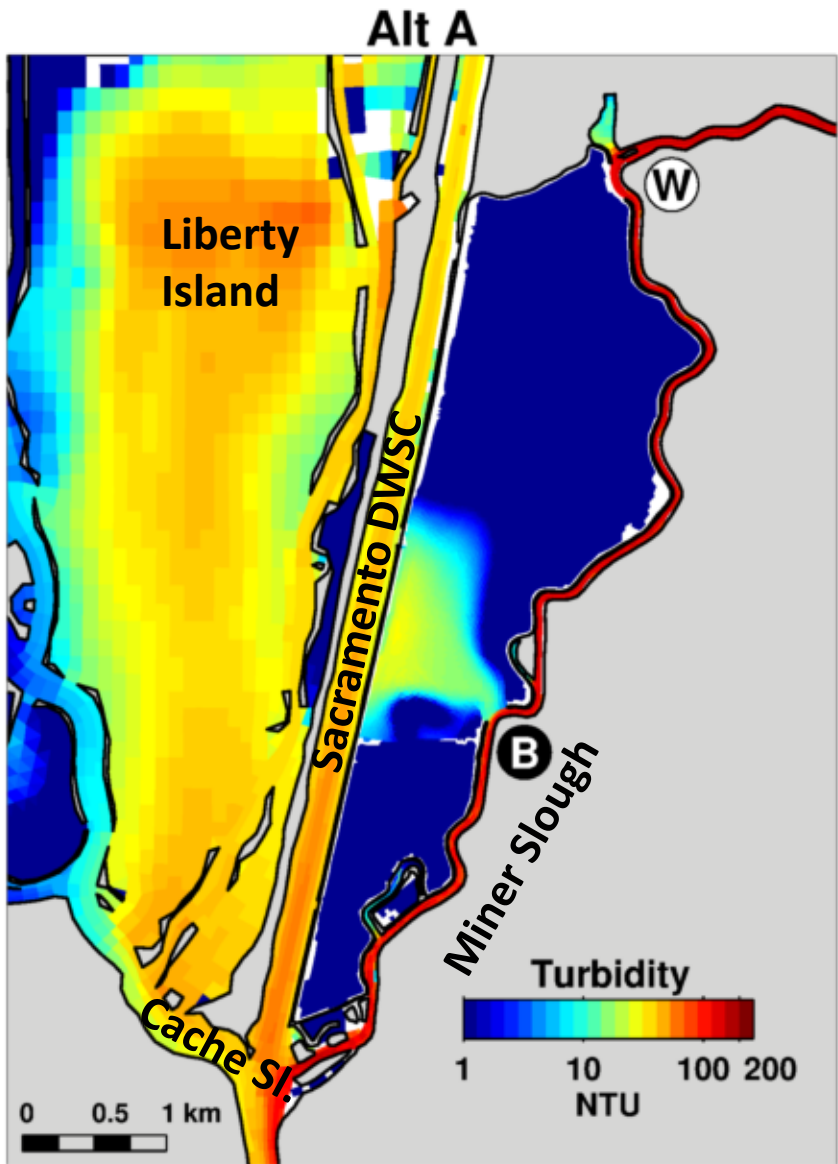
Alt B





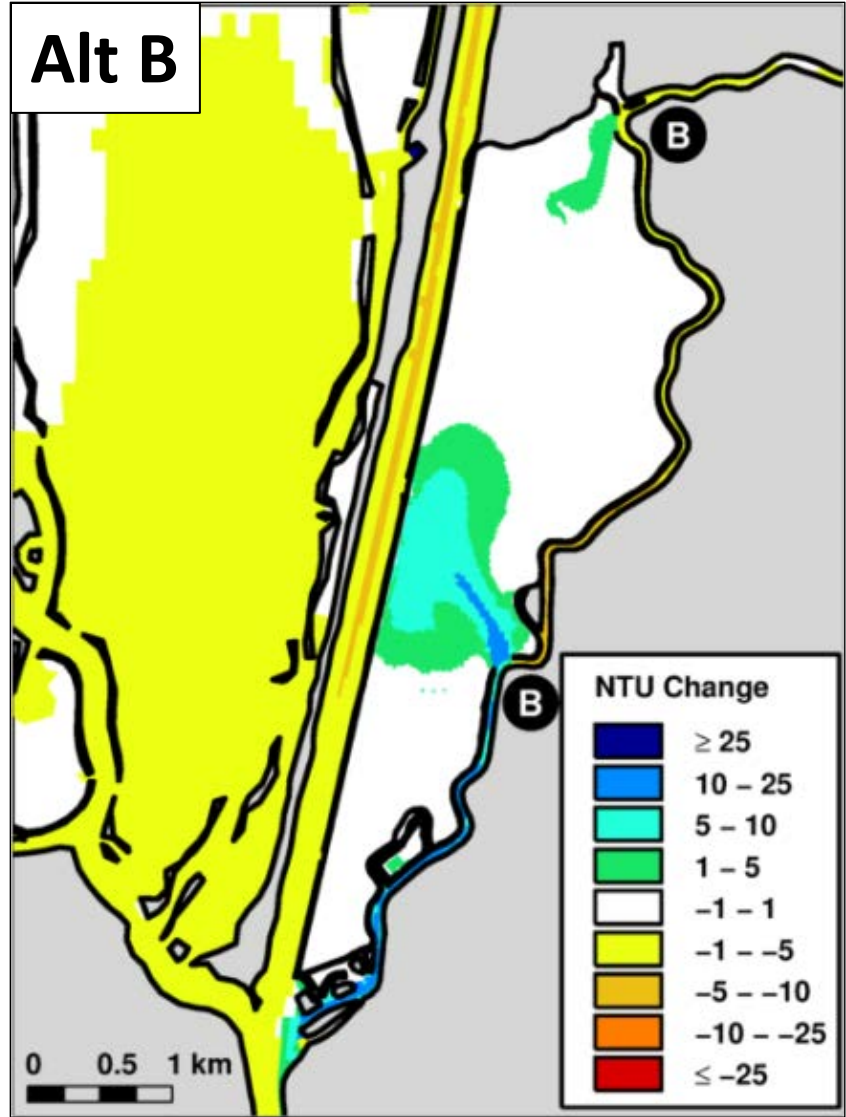
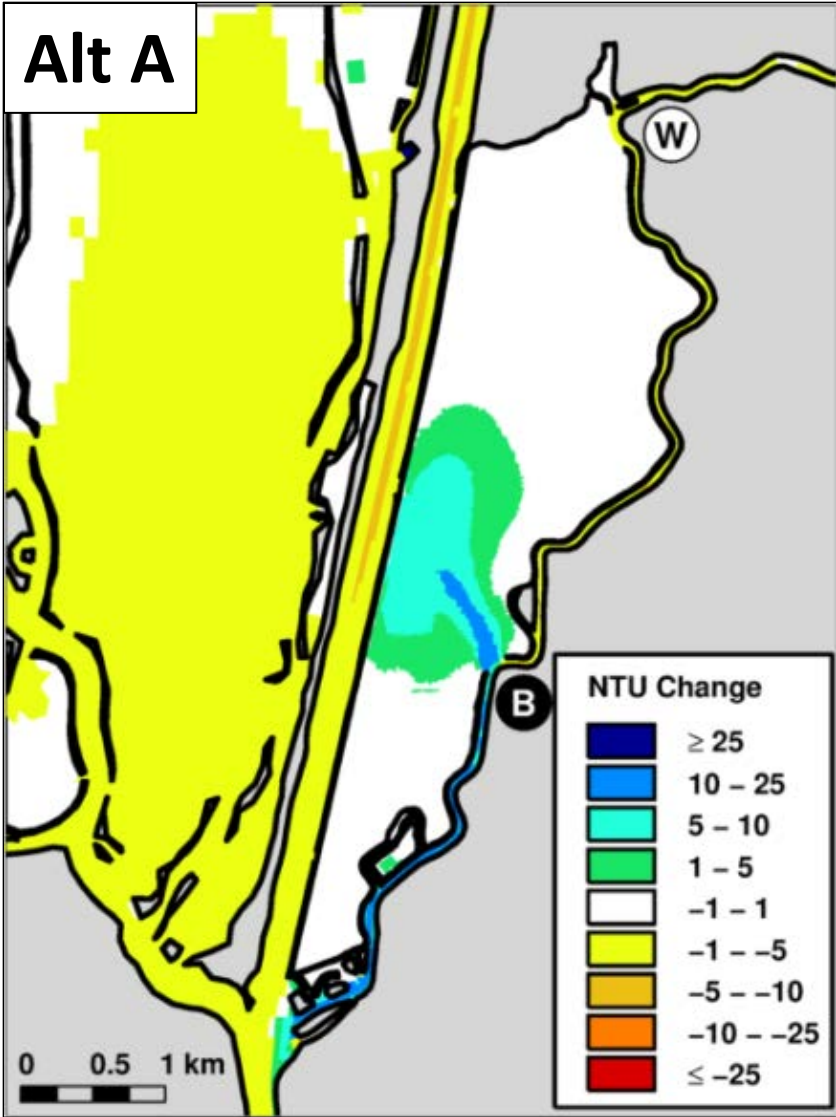
# Predicted Turbidity: High Delta Outflow

30-Dec-2012 00:00 PST



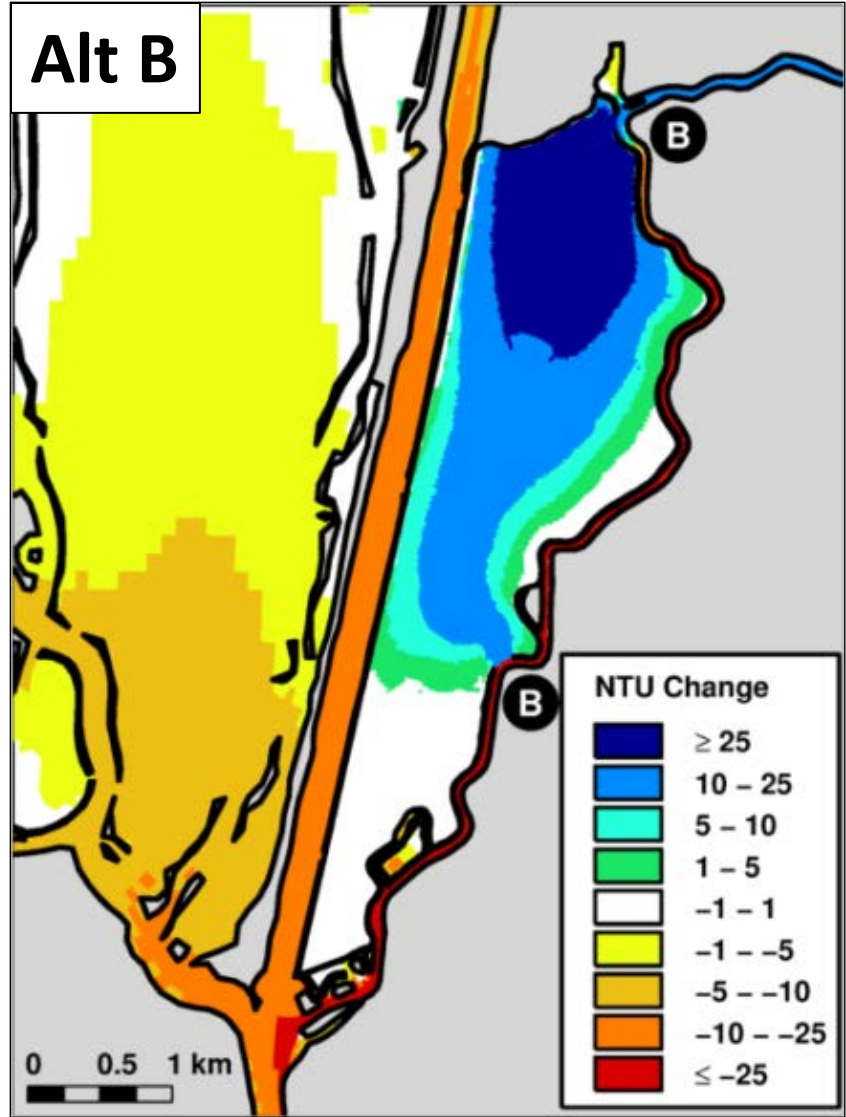
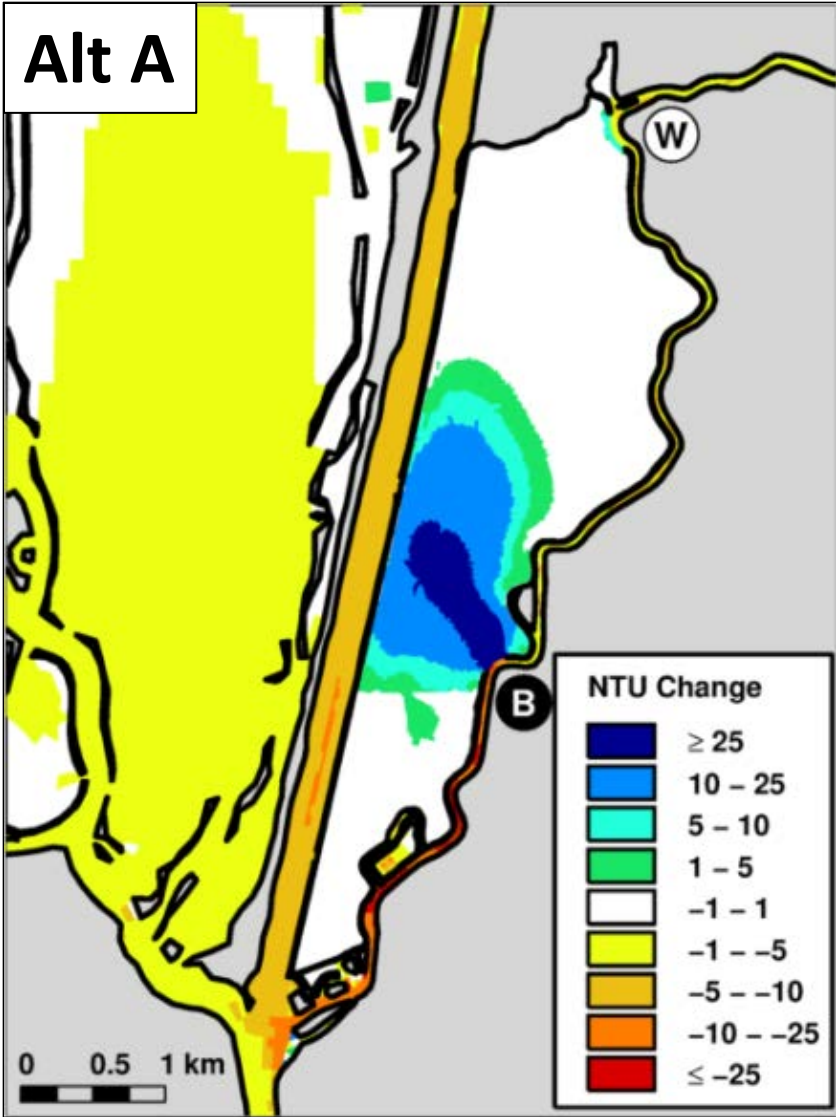
# Predicted Turbidity Change Relative to Baseline

## Low Delta Outflow: Monthly-Average October 2012



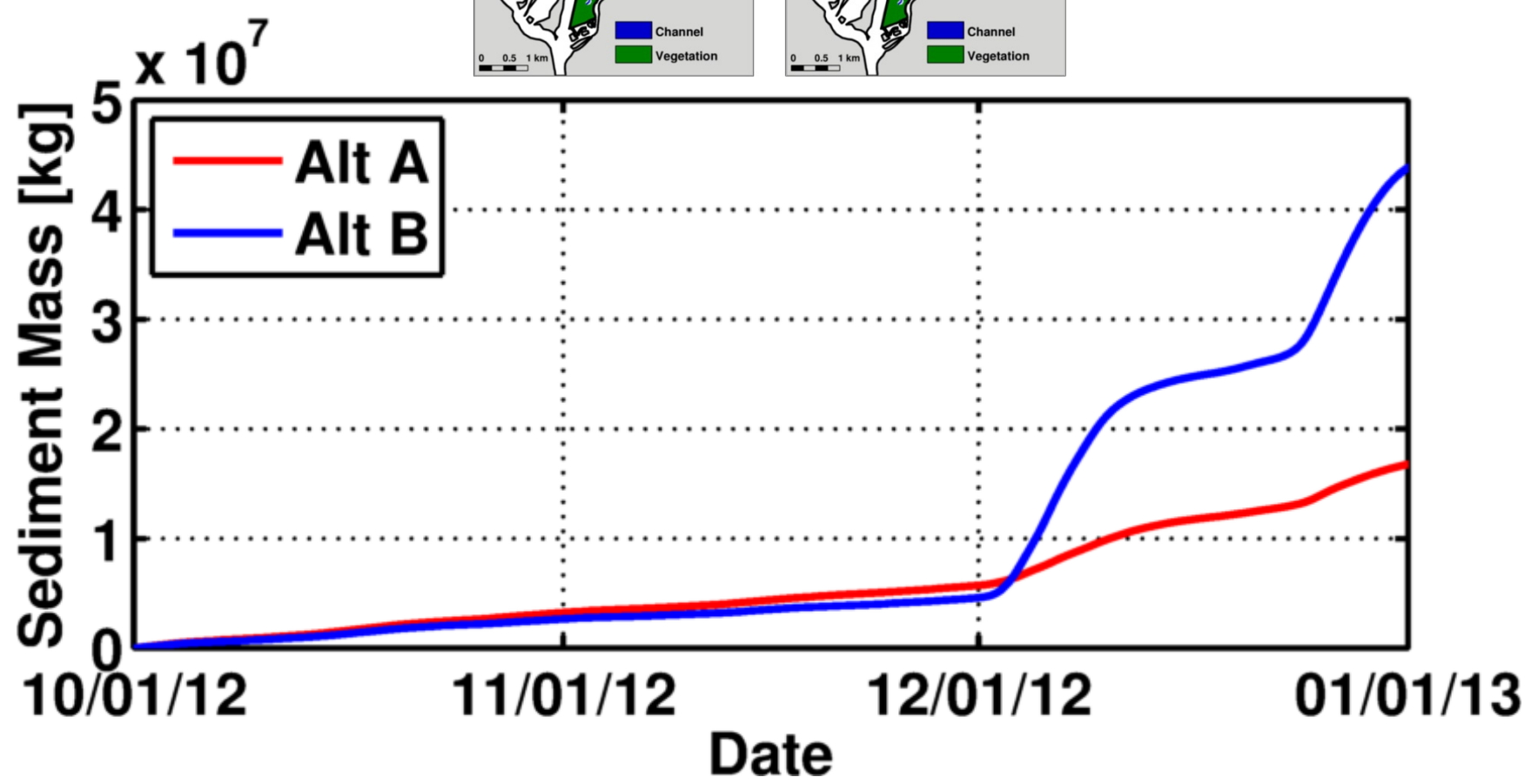
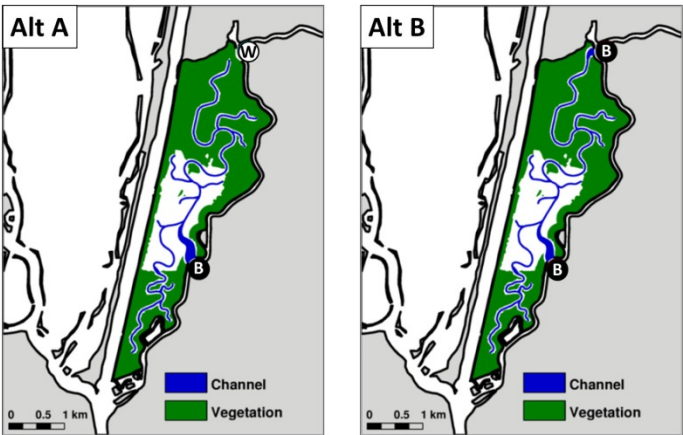
# Predicted Turbidity Change Relative to Baseline

## High Delta Outflow : Monthly-Average December 2012

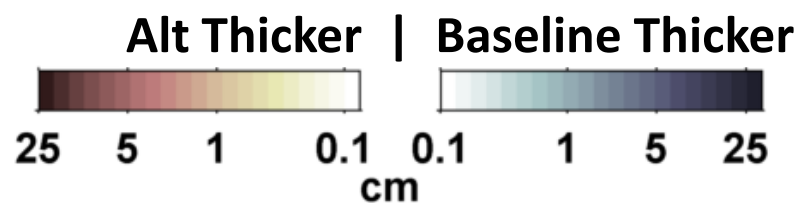




# Cumulative Sediment Mass Transported Into Prospect Island



# Sediment Deposition Relative to Baseline



# Conclusions

- UnTRIM Bay-Delta model applied to simulate hydrodynamic, wave and sediment transport changes resulting from tidal restoration of Prospect Island.
- During low Delta outflow conditions (Oct-Nov 2012):
  - ❖ Turbidity in Miner Slough typically lower than Cache Slough Complex.
  - ❖ Higher turbidity water transported up Miner Slough into Prospect Island on flood tide.
  - ❖ Some of this sediment deposited in low energy environment inside Prospect Island.
- During high Delta outflow conditions (Dec 2012):
  - ❖ Turbidity in Miner Slough typically higher than Cache Slough Complex.
  - ❖ Some sediment from higher turbidity water in Miner Slough is deposited within Prospect Island before reaching Cache Slough.
  - ❖ North breach results in the largest effect on regional turbidity and the most sediment trapping during first flush.
- Uncertainty in model predictions needs to be taken into account when analyzing the results:
  - ❖ Largest uncertainty in assessments based on absolute turbidity values.
  - ❖ Less uncertainty in relative differences between restoration alternatives.



# Acknowledgments

## [Prospect Island Expertise:](#)

Noah Hume (Stillwater)

Melissa Carter (WWR)

Stuart Siegel (WWR)

Chris Enright (DSC)

Erik Loboschefskey (DWR)

## [SediMorph:](#)

Holger Weilbeer (BAW)

## [SWAN:](#)

Ed Gross (RMA)

Jeremy Bricker

## [Sediment Data and Discussions \(USGS\)](#)

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Greg Schellenbarger

Maureen Downing-Kunz

David Schoellhamer

## [JANET Grid Generator:](#)

Christoph Lippert

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